

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows.

1 (currently amended) A transmission device for transmitting data in an installation for working fluids contained underground, the installation comprising a cavity defined in an underground formation and extending to the surface of the ground, and at least one electrically conductive tubular element having a first point at the surface of the ground and a second point within the cavity, the transmission device comprising:

a single-strand smooth cable for supporting an action and/or measurement assembly, said cable having a breaking strength greater than 300 daN, being made of an electrically conductive material, and being disposed in the tubular element between the first point and the second point, wherein a surface of said cable is electrically insulated, at least in part, from the tubular element;

transmitter means for transmitting an electrical and/or electromagnetic signal, said transmitter means being ~~electrically connected to said cable and to the tubular element and/or the underground formation, and being situated in a vicinity of one or both of the first point and the second point, said transmitter means having:~~

a first electrical contact point with the tubular element; and

a second electrical contact point with said cable, said second electrical contact point of said transmitter means being electrically separated from said first electrical contact point of said transmitter means such that said transmitter means can apply a voltage between said first electrical contact point of said transmitter means and said second electrical contact point of said transmitter means; and

receiver means for receiving the electrical and/or electromagnetic signal, said receiver means being ~~electrically connected to said cable and to the tubular element and/or the underground formation, and being situated in a vicinity of the other one or both of the first point and the second point, said receiver means having:~~

a first electrical contact point with the tubular element; and

a second electrical contact point with said cable, said second electrical contact point of said receiver means being electrically separated from said first electrical contact point of

said receiver means such that said receiver means can detect a voltage between said first electrical contact point of said receiver means and said second electrical contact point of said receiver means,⁵

wherein said cable is a portion of a loop for conveying the electrical and/or electromagnetic signal between said transmitter means and said receiver means.

2 (previously presented) A transmission device according to claim 1, wherein said surface of said cable carries a continuous coating of insulating material and is electrically insulated from the tubular element.

3 (previously presented) A transmission device according to claim 2, wherein a thickness of said continuous coating of insulating material is equal to half the difference in diameter between two standard and non-coated cables.

4 (previously presented) A transmission device according to claim 1, wherein said surface of said cable is provided at regular intervals with centralizers of insulating material for electrically insulating said cable from the tubular element.

5 (previously presented) A transmission device according to claim 1,
wherein said transmitter means and said receiver means are electrically connected to the at least one electrically conductive tubular element,

wherein said surface of said cable carries a continuous coating of insulating material and is completely electrically insulated from the at least one electrically conductive tubular element, and

wherein the electrical and/or electromagnetic signal transmitted by said transmitter means and received by said receiver means is an electrical signal.

6 (previously presented) A transmission device according to claim 1,
wherein the at least one electrically conductive tubular element is at least a first tubular element and a second tubular element disposed inside said first tubular element, and

wherein said cable is disposed in an annular space between said first tubular element and said second tubular element.

7 (previously presented) A transmission device according to claim 1,
wherein the surface of the cable has at least one electrical contact point with the at least one electrically conductive tubular element, and
wherein said transmitter means and/or said receiver means, and the at least one electrically conductive tubular element are electrically connected to the underground formation.

8 (currently amended) A transmission device according to claim 7, for transmitting data in an installation for working fluids contained underground, the installation comprising a cavity defined in an underground formation and extending to the surface of the ground, and at least one electrically conductive tubular element having a first point at the surface of the ground and a second point within the cavity, the transmission device comprising:

a single-strand smooth cable for supporting an action and/or measurement assembly, said cable having a breaking strength greater than 300 daN, being made of an electrically conductive material, and being disposed in the tubular element between the first point and the second point, wherein a surface of said cable is electrically insulated, at least in part, from the tubular element;

transmitter means for transmitting an electrical and/or electromagnetic signal, said transmitter means being electrically connected to said cable and to the tubular element and/or the underground formation, and being situated in a vicinity of the first point; and

receiver means for receiving the electrical and/or electromagnetic signal, said receiver means being electrically connected to said cable and to the tubular element and/or the underground formation, and being situated in a vicinity of the second point,

wherein said cable is a portion of a loop for conveying the electrical and/or electromagnetic signal between said transmitter means and said receiver means,

wherein said surface of said cable has at least one electrical contact point with the at least one electrically conductive tubular element,

wherein said transmitter means and/or said receiver means, and the at least one electrically conductive tubular element are electrically connected to the underground formation,

wherein said transmitter means is in a vicinity of the first point;
wherein said receiver means is in a vicinity of the second point;

wherein the electrical and/or electromagnetic signal transmitted by said transmitter means is injected to a first dipole comprising an electrical contact point between said cable and said transmitter means, and an electrical contact point between the underground formation and said transmitter means,

wherein the first dipole generates an electromagnetic signal that is received by a second dipole comprising one of said electrical contact points between said cable and the at least one electrically conductive tubular element, and an electrical contact point between the at least one electrically conductive tubular element and said receiver means, and

wherein the second dipole generates an electrical signal which is conveyed to said receiver means.

9 (currently amended) A transmission device according to claim 7, for transmitting data in an installation for working fluids contained underground, the installation comprising a cavity defined in an underground formation and extending to the surface of the ground, and at least one electrically conductive tubular element having a first point at the surface of the ground and a second point within the cavity, the transmission device comprising:

a single-strand smooth cable for supporting an action and/or measurement assembly, said cable having a breaking strength greater than 300 daN, being made of an electrically conductive material, and being disposed in the tubular element between the first point and the second point, wherein a surface of said cable is electrically insulated, at least in part, from the tubular element;

transmitter means for transmitting an electrical and/or electromagnetic signal, said transmitter means being electrically connected to said cable and to the tubular element and/or the underground formation, and being situated in a vicinity of the second point; and

receiver means for receiving the electrical and/or electromagnetic signal, said receiver means being electrically connected to said cable and to the tubular element and/or the underground formation, and being situated in a vicinity of the first point,

wherein said cable is a portion of a loop for conveying the electrical and/or electromagnetic signal between said transmitter means and said receiver means,

wherein said surface of said cable has at least one electrical contact point with the at least one electrically conductive tubular element,

wherein said transmitter means and/or said receiver means, and the at least one electrically conductive tubular element are electrically connected to the underground formation,

wherein said transmitter means is in a vicinity of the second point,

wherein said receiver means is in a vicinity of the first point,

wherein the electrical and/or electromagnetic signal transmitted by said transmitter means is injected into a second dipole comprising one of said electrical contact points between said cable and the at least one electrically conductive tubular element, and an electrical contact point between the at least one electrically conductive tubular element and said transmitter means,

wherein the second dipole generates an electromagnetic signal received by a first dipole comprising an electrical contact point between said cable and said receiver means and an electrical contact point between the underground formation and said receiver means, and

wherein the first dipole generates an electrical signal that is conveyed to said receiver means.

10 (previously presented) A transmission device according to claim 1,
further comprising a conductor member anchored in the ground,
wherein said conductor member electrically connects said transmitter means and/or said receiver means, in the vicinity of the first point, to the underground formation.

11 (previously presented) A transmission device according to claim 1, wherein said transmitter means and said receiver means are situated in the vicinity of the first point and the second point, respectively.

12 (previously presented) A transmission device according to claim 1, wherein said transmitter means is situated solely in a vicinity of one of the first point and the second point, and said receiver means is situated solely in a vicinity of the other one of the first point and the second point.

13 (previously presented) An installation for working fluids contained underground, the installation comprising:

- a cavity defined in an underground formation extending to the surface of the ground and closed on the surface by a wellhead;
- at least one electrically conductive tubular element provided in said cavity; and
- a transmission device according to claim 1.

14 (previously presented) An installation according to claim 13, further comprising an applicator device for applying an insulating coating on said cable.

15 (previously presented) An installation according to claim 14,

wherein said applicator device is disposed inside an airlock preceding the wellhead, the airlock including a sealing device for said cable, said applicator device being located downstream from the sealing device.

16 (previously presented) An installation according to claim 14, further comprising:

deployment means for deploying said cable; and
an alignment device for aligning said cable in the wellhead, said alignment device comprising at least one pulley, each pulley being electrically insulated from the wellhead and/or the underground formation,

wherein said applicator device is disposed between said deployment means and said alignment device.

17 (previously presented) A transmission device according to claim 1, wherein said cable has a resistivity that is greater than 30 mΩ/m.

18 (previously presented) A transmission device according to claim 1, wherein said cable is a slickline cable or a “piano wire” cable.

19 (new) A transmission device according to claim 1, wherein said second electrical contact point of at least one of said transmitter means and said receiver means is located outside of the cavity in the vicinity of the first point.

20 (new) A transmission device according to claim 1,

wherein each of at least one of said transmitter means and said receiver means in a vicinity of the first point are connected to said cable through a first electrical line and connected to the tubular element through a second electrical line different from the first electrical line.

21 (new) A transmission device for transmitting data in an installation for working fluids contained underground, the installation comprising a cavity defined in an underground formation and extending to the surface of the ground, and at least one electrically conductive tubular element having a first point at the surface of the ground and a second point within the cavity, the transmission device comprising:

a single-strand smooth cable for supporting an action and/or measurement assembly, said cable having a breaking strength greater than 300 daN, being made of an electrically conductive material, and being disposed in the tubular element between the first point and the second point, wherein a surface of said cable is electrically insulated, at least in part, from the tubular element;

transmitter means for transmitting an electrical and/or electromagnetic signal, said transmitter means being electrically connected to said cable and to the tubular element and/or the underground formation, and being situated in a vicinity of one or both of the first point and the second point; and

receiver means for receiving the electrical and/or electromagnetic signal, said receiver means being electrically connected to said cable and to the tubular element and/or the underground formation, and being situated in a vicinity of the other one or both of the first point and the second point,

wherein said cable is a portion of a loop for conveying the electrical and/or electromagnetic signal between said transmitter means and said receiver means, and

wherein said cable does not comprise a mechanical reinforcement jacket.

22 (new) A transmission device according to claim 21, wherein said cable has a resistivity that is greater than 30 mΩ/m.